

7D20

PROGRAMMABLE DIGITIZER

Tektronix®
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Introduction

This reference guide is intended to help a user to operate the 7D20. Settings and commands are explained briefly and a **page number** in the 7D20 Operator's Manual is given for obtaining further information.

Front Panel Settings

Shift Functions 2-92

f: Shift function allows access to functions highlighted in orange.
Push '*f*' then function key.

Vertical Amplifier 2-92

VOLTS/DIV: Sets vertical sensitivity in 1,2,5 sequence from 5mV/Div to 5V/Div.

VARIABLE: Continuously variable to at least 12.5 Volts/Div.

COUPLING: AC; Provides AC coupling of input signal.
DC; Provides DC coupling of input signal.
GND; Sets VZR(Vertical Zero Reference) for the digitizer.

INVERT: Inverts signal connected to Channel 2.

POSITION: Adjusts position of trace vertically ± 10 divisions from center graticule.

Time Base Controls 2-96

TIME/DIV: Sets horizontal sweep speed in 1,2,5 sequence from 50ns/Div to 20s/Div and selects EXT CLOCK.

POSITION: Positions waveforms horizontally.

Trigger Controls 2-103

SLOPE: Trigger on positive (when illuminated) or negative slope.

LEVEL: Sets trigger level.

◀ **TRIG POS:** Adjusts for 0 to 1500 divisions post-trigger.

TRIG POS ▶: Adjusts for 0 to 10 divisions pretrigger.

Trigger Source 2-99

MODE: Trigger source set by Acquire Mode.

CH1: Triggers on Channel 1 input signal.

CH2: Triggers on Channel 2 input signal.

LINE: Triggers on mainframe line frequency.

EXT: Triggers on external trigger input ($\pm 1V$ max).

f, **EXT** $\div 10$: Triggers on external trigger input with 10X attenuation ($\pm 10V$ max).

Trigger Coupling 2-100

AC: AC couples trigger signal ($-3dB$ at 30Hz nominally.)

LF REJ: AC couples trigger signal ($-3dB$ point at 40kHz nominally.)

HF REJ: Sets high frequency ($-3dB$ point at 40kHz nominally.)

DC: DC couples trigger signal.

Trigger Mode 2-101

P-P: Triggers at a % of peak-to-peak trigger or free runs when no signal present.

AUTO: Triggers on adequate signal level or free runs.

NORM: Sweep is generated only on adequate trigger. Use for repetitive signals below 30 Hz.

HOLD NEXT: Terminates acquisition at end of next waveform acquisition.

Acquire Mode 2-95

CH1→1: Acquires signal from Channel 1 Vertical into Memory 1.

BOTH: Acquires signals from Channel 1 and Channel 2 into Memories 1 and 2 respectively.

ADD: Acquires the sum of Channel 1 and Channel 2 into Memory 1.

CH2→2: Acquires signal from Channel 2 Vertical into Memory 2.

Memory Display 2-105

1-6: Displays contents of Waveform Memories 1-6.

COPY: Copies contents of one memory into another.

EXAMPLE: 'COPY 1-}6' places waveform from Memory 1 into Memory 6.

Memory Display (Continued)

CSW: Selects cursor waveform.

EXAMPLE: 'CSW 3' sets Waveform 3 as the Cursor Waveform for modifying and making cursor measurements.

f, REF: When Cursor Waveform is in 'HMAG' or 'VS,' causes unmagnified Y-T display of Cursor Waveform.

Cursor Waveform Controls 2-108

VXPD: Cursor Waveform is expanded to the next more sensitive vertical setting in 1,2,5 sequence.

VCMP: Cursor Waveform is compressed to the next less sensitive vertical setting in 1,2,5 sequence.

HMAG: Causes a ten times horizontal magnification of the Cursor Waveform.

f, HMAG ALL: Causes a ten times horizontal magnification of all stored and displayed waveforms.

VPUP: Positions the Cursor Waveform upward on the CRT display.

VPDN: Positions the Cursor Waveform downward on the CRT display.

VS: Puts 7D20 in X-Y mode with the Cursor Waveform as Y and any other waveform as X.

EXAMPLE: When VS is pressed, 'CSW 1 VS #' is displayed. The user then enters a number from 1 to 6.

Cursor Controls 2-112

- ◀1: Positions Cursor 1 to the left.
- 1▶: Positions Cursor 1 to the right.
- ◀2: Positions Cursor 2 to the left.
- 2▶: Positions Cursor 2 to the right.
- f*, **△ON**: Turns on Cursor 2.
- f*, **△OFF**: Turns off Cursor 2.
- f*, **INDEP**: Allows each waveform to maintain independent cursor positions.
- f*, **ALIGN**: Aligns cursors on all waveforms to the cursor positions on the Cursor Waveform.

Waveform Processing Controls 2-115

- SET N**: Determines value of 'N' for use with 'AVE' and 'ENV' controls. 'N' is set in powers of 2 from 8 to 256.
- AVE**: Incoming signal is averaged until terminated by 'HOLD' or 'HOLD NEXT'.
- ENV**: Continuous envelope of the incoming signal is displayed until terminated by 'HOLD' or 'HOLD NEXT'.
- f*, **AVE N**: Averages 'N' waveforms then enters HOLD.

Waveform Processing Controls (Continued)

f, **ENV N**: Envelopes 'N' waveforms then enters HOLD.

HOLD: Terminates acquisitions immediately.

VECTOR: Turns vectors joining adjacent data points ON or OFF.

Special Functions 2-120

ID: Produces a special GPIB and instrument identification menu which is used to select GPIB system parameters.

RQS: Generates a service request (SRQ).

f, **RQS #**: Generates SRQs with unique event codes. Push **RQS#** and a number from 1 to 6.

PROBE

IDENTIFY: Pushing the probe identify button on a P6053B Probe will generate an SRQ with a unique event code for either Channel 1 or Channel 2.

Menu Driven Functions 2-83

Press the MEMORY DISPLAY buttons to make the menu selections.

MENU: Displays the following menu:

MASTER MENU

- 1, # STORE PANEL #
- 2, # RECALL PANEL #
- 3, DISPLAY CAL PATTERN
- 4, UTILITIES

1, # STORE PANEL #: Stores the current front panel settings in a user selectable, non-volatile settings memory location (1-6).

2, # RECALL PANEL #: Recalls and immediately implements any one of the front panel settings previously stored using the STORE PANEL function.

3, DISPLAY CAL PATTERN: Displays a calibration pattern on the CRT to allow corrections to the 7D20's display presentation.

Press button 4 to display the following Utilities Submenu:

UTILITIES

- 1 SEND CSW ASCII
- 2 SEND CSW BINARY
- 3 READOUT ON/OFF
- 4 EXT CLOCK POLARITY
- 5 INIT FRONT PANEL
- 6 MASTER MENU

1 SEND CSW ASCII: Sends the Cursor Waveform preamble and data points to another device in LISTEN ONLY mode. 7D20 must be in TALK ONLY mode. Data encoding is ASCII.

Menu-Driven Functions (Continued)

2 SEND CSW BINARY: Same as #1, except that data points encoding is binary.

3 READOUT ON/OFF: Turns text displayed on lines 1,2 and 15,16 on and off. Lines 3-14 are always available to display menus or text.

4 EXT CLOCK POLARITY: Determines which transition (+ or -) of the External Clock will be recognized by the 7D20 when EXT CLOCK is selected.

5 INIT FRONT PANEL: Initializes front-panel settings to the following conditions;

VERTICAL

VOLTS/DIV: 1

COUPLING: AC

CH2 INVERT: OFF

TRIGGERING

MODE: P-P

HOLD NEXT: OFF

COUPLING: AC

SOURCE: MODE

SLOPE: POS

POSITION: 0

HORIZONTAL

TIME/DIV: 1ms

EXT CLOCK POLARITY: POS

MEMORY DISPLAY

DISPLAY 1: ON

DISPLAY 2-6: OFF

CSW: OFF

COPY: OFF

REF: OFF

CURSOR WFM

CSW: 1

VXPD,VCMP,VPUP,VPDN: OFF

HMAG,VS: OFF

ACQUISITION

ACQ MODE: CH1

CURSORS

MODE: ALIGN

△ON: OFF

CURSOR 1: POINT 0

CURSOR 2: POINT 1023

OTHER

AVE,AVEN,ENV,ENVN: OFF

MENU,RQS,RQS #,ID,HOLD: OFF

6 MASTER MENU: Displays the Master Menu

f, TEST: Displays the following Test Menu

TEST MENU

1 EXECUTE SELFTEST

2 ★ CALIBRATION ★

3 ★ EXTENDED TEST ★

4 ★ CIRCUIT EXERCISER ★

★ SERVICE ONLY ★

All selections (other than item 1, SELFTEST) are for qualified service personnel only.

Warning Messages 2-88

The following warning messages are displayed in the Prompt Field of the CRT:

0-10 TPOS

REQD: Displayed when ROLL or EXternal CLOCK mode entered with a negative trigger position, with AVE or ENV active. Indicates that Posttrigger is unavailable.

HOLD REQD: Displayed if VPUP, VPDN, VCMP or VXPDP is pushed while the 7D20 is actively acquiring into the Cursor Waveform. Indicates HOLD mode is required.

HMAG, VS

REQD: Displayed if 'REF' is pushed when the 7D20 is not displaying a Magnified Cursor Waveform or is not in VS mode.

CSW REQD: Displayed if the user attempts to turn the Cursor Waveform display off. The CSW is required at all times.

UPDATE

IGNORED: Displayed after an attempt to change any of the parameters in the ID Menu when the 7D20 is in the REMOTE-with-lockout state.

RQS OFF: Occurs when the RQS or probe Identify button is pushed and the RQS Mask has been turned off or GPIB Service Requests are disabled.

The following Error Messages are all displayed when there is a failure in the Selftest. The EAROM FAILED message is also given when the RECALL command is executed and the memory called contains invalid data. Refer to qualified service personnel for corrective action.

SELFTEST FAIL

GPIB FAILED

EAROM FAILED

GPIB Functions

Selectable Parameters 4-4

Pushing the 'ID' button displays the following special function menu:

GPIB IDENTIFICATION

ID TEK/7D20,<rom>.<patch>

4 SELECT MODE

5 SELECT TERMINATOR

6 SELECT ADDRESS

PRESS ID KEY TO UPDATE AND EXIT

NO UPDATE IN REMOTE ONLY

SELECTABLE

MODES: OFF, TALK ONLY, LISTEN ONLY, TALK/LISTEN

SELECTABLE

TERMINATORS: EOI, LF/EOI

SELECTABLE

ADDRESSES: 0-30

Selections are made by pushing the numbered keys in the MEMORY DISPLAY function group. All selections will be implemented when 'ID' is pressed to exit.

Command Format: 4-11

The 7D20 command format is the following:

HEADER/LINK/ARGUMENT. Command names are spelled as printed on the front panel.

The response of the 7D20 to a Help Query (**HELP?**) is a list of all of the valid command headers:

HELP?

CH1, CH2, TRIGGER, HORIZONTAL, DISPLAY, COPY, CSW, AQR,
CURSOR, STORE, RECALL, DT, INIT, TEST, CAL, RQS, CER, EXR, INR,
EXW, OPC, USER, PID, WFMPRE, CURVE, DATA, TEXT, DEBUG,
RECORDING, LONGFORM

Header, link, and argument names may be abbreviated as long as the abbreviations are unique. The following example shows three identical GPIB commands:

TRIGGER MODE:P-P, COUPLING:ACHFREJ, SLOPE:PLUS

TRIG MODE:P-P, COUP:ACHFREJ, SLOP:PLUS

TR MO:P-, COUP:ACH, SL:PL

Multiple commands may be sent in a single string provided they are separated by a semicolon.

EXAMPLE (Multiple Command string):

TRIG SOURCE:MODE; DISP 1:ON

Command Format (Continued)

Multiple arguments are separated by a comma.

EXAMPLE (Multiple arguments):

TRIG SOURCE:MODE, COUP:AC

Queries

Queries solicit information from the 7D20. They consist of a header followed by a '?' or a header followed by a '?' followed by a label.

EXAMPLE (Header only query):

CH1?

7D20 Response:

CH1 VO:2, POSI:-1, COUP:AC, VA:ON

EXAMPLE (Header and label query):

CH1? VOLTS

7D20 RESPONSE:

CH1 VO:2

Queries may be abbreviated using the same guidelines as for abbreviating commands.

LONGFORM ON | OFF: sets the 7D20 response to queries to either abbreviated or longform.

FATAL ERROR	227	243
POWER ON	65	81
USER REQUEST	67	83
EXECUTION ERROR	98	114
INTERNAL ERROR	99	115
EXECUTION WARNING	101	117
INTERNAL WARNING	102	118
OPERATION COMPLETE	66	82
NO STATUS TO REPORT	0	16

The first column of decimal values are generated without the busy bit set and the second column is with the busy bit set. The 7D20 is considered busy if in process of AVEN, ENVN, or HOLD NEXT.

Event Queries (EVENT? or ERROR?) 4-32

The EVENT QUERY is a means of providing detailed information as to the nature of, or the reason for, the generation of a Service Request (SRQ).

EVENT? Is responded to with an event code defined below.

EVENT {#}

ALLEV? Is responded to with a list of all pending event codes.

EVENT {1},{2},...

Event Queries (Continued)

EVQTY? is responded to with the number of pending event codes.

EVQTY {#}

Defined Event Codes:

CODE

DESCRIPTION

COMMAND ERRORS

108	Checksum Error in Curve Data
109	Illegal Byte count Error
151	Symbol or Number too long
152	Invalid or Control Character Input
153	Invalid Special Character After Escape
154	Invalid Number Input
155	Invalid String Input
156	Symbol not found
157	Syntax Error
158	Invalid EOI
159	Invalid Delimiter
160	Expression too complex
161	Excessive Binary Curve Points
162	Excessive ASCII Curve Points

EXECUTION ERRORS

- 203 I/O Buffers full, Output dumped
- 250 Not in HOLD mode.
- 251 Illegal Waveform Number
- 252 Illegal Settings Memory
- 253 Illegal Cursor Number
- 254 Settings RECALL error
- 255 Display Reference error
- 256 Turning off CSW display error
- 257 Illegal Data Memory Number
- 258 ROLL mode, AVE, ENV, negative
TRIGGER POSITION error
- 259 Waveform Preamble illegal NR.PT

INTERNAL ERRORS

- 331 SELFTEST failure Module 1
- 332 SELFTEST failure Module 2
- 330+X SELFTEST failure Module X(X=1 – 63)
- 394 SELFTEST complete and it failed

SYSTEM EVENTS

401	Power ON
403	User Request (RQS KEY)
450	HOLD after AVEN, ENVEN, or HOLD NEXT
451	RQS 1
452	RQS 2
453	RQS 3
454	RQS 4
455	RQS 5
456	RQS 6
457	RQS 7(CH1 Probe Identify)
458	RQS 8(CH2 Probe Identify)
459	SRQ pending
460	SELF TEST COMPLETED and PASSED

EXECUTION WARNING

550	VOLTS/DIV out of range
551	VERTICAL POSITION out of range
552	TRIGGER LEVEL out of range
553	TRIGGER POSITION out of range
554	HORIZONTAL TIME/DIV out of range
555	VXPD out of range
556	CSW POSITION out of range
557	SET N value out of range

558	CURSOR POSITION out of range
559	ASCII point out of range
560	WFMPRE XINCR out of range
561	WFMPRE PT.OFF out of range
562	WFMPRE YMULT out of range
563	WFMPRE YZERO out of range

Debugging 4-76

DEBUG ON: Commands sent to the 7D20 will appear in the text field of the CRT as ASCII characters until an EOI is encountered. When an error is encountered, the word '**ERROR**' will appear along with the event code which describes the error.

Recording 4-76

RECORDING

ON: When the 7D20 is in ROLL mode, at the end of each acquisition the waveform will be transferred to a temporary holding buffer and an Operation Complete SRQ will be asserted. This allows the user to continuously acquire waveforms by sending a CURVE Query after Operation Complete SRQ.

Waveform Transfers

Waveform data consists of a Preamble containing encoding and setup information, followed by Curve Information containing actual data points.

FORMAT: {preamble}{separator}{curve}{terminator}

TERMINATOR	SEPARATOR
{eoi}	{:}
{cr lf/eoi}	{:}

DATA ENCODING: May be ASCII or BINARY and is set with the following commands:

4-24 **DATA ENCDG:ASC** or **DATA ENCDG:BIN**

DATA INTERPOLATE: Sets 820 to 1024 point interpolation mode for all extended realtime waveforms transmitted from the 7D20.

EXAMPLE: **DATA INTERPOLATE:ON**

DATA MEMORY: Sets the memory destination and source for all waveform transmissions.

4-24

EXAMPLE DATA MEM:1:

1 = Waveform Register Number(1-6)

WFMPRE?: Responds with the current source waveform's preamble.

4-20: **If ASCII:**

WFMPRE WFID:<wfmid>,ENCDG:ASC,
NR.PT:<p/w>,PT.FMT:Y,XINCR:<x increment>,
PT.OFF:<point #>,XZERO:0,XUNIT:<x unit>,YMULT:<y
multiplier>,YZERO:<y zero>,YUNIT:<y unit>

If BINARY:

WFMPRE WFID:<wfmid>,ENCDG:BIN,
NR.PT:<p/w>,PT.FMT:Y,XINCR:<x increment>,
PT.OFF:<point #>,XZERO:0,XUNIT:<x unit>,YMULT:<y
multiplier>,YZERO:<y zero>,YUNIT:<y unit>,BYT/NR:1,
BN.FMT:LF,BIT/NR:8,CRVCHK:CHKSMO

Where:

<wfmid> = W(Waveform #) or W(Waveform #)l
'l' indicates interpolated data.

<p/w> = Points per waveform

<x increment> = Time between points

<point #> = Trigger point

<y multiplier> = Vertical scale factor

Waveform Transfers (Continued)

$\langle y \text{ zero} \rangle = -(\text{VZR} \times \text{Vertical Scale Factor})$

$\langle y \text{ unit} \rangle ::= \text{Displayed vertical scale factor unit.}$

$\langle x \text{ unit} \rangle ::= \text{Displayed horizontal scale factor unit.}$

CURVE?: Responds with the current Source WFM's CURVE data.

4-23 Format:

If ASCII:

CURVE $\langle \text{ascii point} \rangle, \dots$

$\langle \text{ascii point} \rangle = -5.12 \text{ to } +5.08 \text{ divisions from center screen.}$

If BINARY:

CURVE % $\langle \text{binary count} \rangle$

$\langle \text{binary point} \rangle \dots \langle \text{checksum} \rangle$

$\langle \text{binary count} \rangle = \text{A 2-byte representation of the number of binary points plus one for the checksum byte.}$

$\langle \text{binary point} \rangle = \text{8-bit byte, integer binary from 0 at screen bottom to 255 at the top of screen.}$

$\langle \text{checksum} \rangle = \text{2's complement of the modulo 256 sum of the preceding binary data bytes and the binary count}$

WAVFRM?: Responds with the current source waveforms preamble and curve data.
4-24

Text Handling 4-17

TEXT: Causes the 7D20 to display text in the center 12 lines of the CRT.

EXAMPLE: PRINT @A: "TEXT" "TEST 51""
causes 'TEST 51' to be printed on the 7D20 host CRT.

SPECIAL CHARACTERS: The 7D20 accepts the following special characters:

↓(Down Arrow)=:ESC a

△(Delta)=:ESC d

m(Milli)=:ESC m

μ(Micro)=:ESC u

p(Pico)=:ESC p

n(Nano)=:ESC n

→(Right Arrow)=:ESC r

↑(Up Arrow)=:↑

TAB(5 Spaces)=:ASC CODE 09 (HEX)

TEXT?: Responds with the center 12 lines of display text(lines 3-14).

RDOUT?: Responds with the four lines of readout from the CRT display(lines 1,2,15 and 16).

ID? and SET? Queries 4-75

ID?: Responds with the 7D20's ID;
ID TEK/7D20,⟨rom⟩.⟨patch⟩

SET?: Responds with a string containing all of the front-panel settings and is the same as sending all of the following queries:
CH1?;CH2?;HORIZ?;AQR?;CSW?;
DISP?;TRIG?;CURS?

Device Trigger 4-62

DT OFF: Disables 7D20 to a Group Execute Trigger

DT HOLD|HOLDN|AVE|AVEN|ENV|ENVN

NORMAL: Deferred command is executed on GET Interface Message. Only one deferred command may be triggered from each GET. Previous pending deferred commands are cleared without execution

DT?: Responds with the deferred command to be executed on the next GET Interface message.

Initialization 4-63

INIT: Causes full initialization of settings, waveform memories, and GPIB functions.

INIT PANEL: Initializes front-panel settings to value described in the Utilities Menu section.

INIT WAVFRM: Sets all data points to zero in waveform memories 1-6 and sets VPUP, VPDN, VXPB, VCMP, HMAG, VS and REF to an OFF condition.

INIT GPIB: Turns On EXR, INR, SYS, EXW, OPC, USER, RQS, CER, DATA ENCODING BINARY, LONGFORM
Turns Off PID, DT, DEBUG, INTERPOLATE, RECORDING

7D20 Command Set

CHANNEL 1 GROUP 4-39

CH1 VOLts: $\langle 5 \text{ E-3 to } 5 \rangle$

CH1? VOLts

CH1 POSItion: $\langle -10.24 \text{ to } +10.22 \rangle$

CH1? POSItion

CH1 COUPling: AC | GNd | DC

CH1? COUPling

CH1 VARiable: ON | OFF

CH1? VARiable

CH1? PRobe

CH1?

CHANNEL 2 GROUP 4-42

CH2 VOLts: $\langle 5 \text{ E-3 to } 5 \rangle$

CH2? VOLts

CH2 POSItion: $\langle -10.24 \text{ to } +10.22 \rangle$

CH2? POSItion

CH2 COUPling: AC | GNd | DC

CH2? COUPling

CH2 VARiable: ON | OFF

CH2? VARiable

CH2 INVert: ON | OFF

CH2? INVert
CH2? PRobe
CH2?

TRIGGERING GROUP 4-45

TRigger MODE: P-p | AUto | NOrmal
TRigger? MODE
TRigger HOLDN: ON | OFF
TRigger? HOLDN ext
TRigger COUPling: AC | ACL frej | DCH frej | DC | ACH frej
TRigger? COUPling
TRigger SOURCE: MODE | CH1 | CH2 | Line | EXT | EXT/10
TRigger? SOURCE
TRigger SLOpe: PLus | MInus
TRigger? SLOpe
TRigger LEvel: $\langle -6.4 \text{ to } +6.35 \rangle$
TRigger? LEvel
TRigger POSItion: $\langle -1500 \text{ to } +10 \rangle$
TRigger? POSItion
TRigger?

TIME/DIVISION GROUP 4-48

HORizontal TIme: $\langle 5 \text{ E-9 to } 20 \rangle$
HORizontal? TIme

TIME/DIVISION GROUP (Continued)

HORizontal POSITION: ON | OFF

HORizontal? POSITION

HORizontal CLOCK: INTernal | EXTP | EXTN

HORizontal? CLOCK

HORizontal?

DISPLAY GROUP 4-50

Display 1: ON | OFF

Display? 1

Display 2: ON | OFF

Display? 2

Display 3: ON | OFF

Display? 3

Display 4: ON | OFF

Display? 4

Display 5: ON | OFF

Display? 5

Display 6: ON | OFF

Display? 6

Display CSw: { 1 to 6 }

Display? CSw

Display VECTOR: ON | OFF

Display? VECTOR

Display REFerence:ON|OFF
Display? REFerence
Display RDout:ON|OFF
Display? RDout
Display?
COPY 1:⟨1 to 6⟩
COPY 2:⟨1 to 6⟩
COPY 3:⟨1 to 6⟩
COPY 4:⟨1 to 6⟩
COPY 5:⟨1 to 6⟩
COPY 6:⟨1 to 6⟩

CURSOR WAVEFORM GROUP 4-53

CSw? VOLts
CSw VXpd:⟨-2 to +2⟩
CSw? VXpd
CSw POSItion:⟨-5.12 to +5.08⟩
CSw? POSItion
CSw HMag:ON|OFF|ALLON|ALLOFF
CSw? HMag
CSw VS:⟨1 to 6⟩
CSw? VS
CSw?

ACQUISITION GROUP 4-56

AQr MODE:CH1|BOTH|ADD|CH2

AQr? MODE

AQr HOLD:ON|OFF

AQr? HOLD

AQr SET:8|16|32|64|128|256

AQr? SET

AQr TYPE:NORMAL|AVE|AVEN|ENV|ENVN

AQr? TYPE

AQr?

RECORDing ON|OFF

CURSOR GROUP 4-59

CURSOR MODE:INDEP|ALIGN

CURSOR? MODE

CURSOR DELTA:ON|OFF

CURSOR? DELTA

CURSOR 1:(0 to 1023)

CURSOR? 1

CURSOR 2:(0 to 1023)

CURSOR? 2

CURSOR?

COORD? VCrd

COORD? HCrd

COORD?

FRONT PANEL SETTINGS GROUP 4-61

STOre {set number}

RECall {set number}

DEVICE TRIGGERING 4-62

DT OFF | HOLD | HOLDN | AVE | AVEN | ENV | ENVN | NOrmal
DT?

INITIALIZATION 4-63

INIt

INIt PAnel

INIt WAveform

INIt GPib

SELFTEST GROUP 4-64

TESt

TESt CONtinue

TESt EXIt

CALIBRATION GROUP 4-65

CAI DIsplay

CAI DDac

CAI POSOff

CAI POSGain

CALIBRATION GROUP (Continued)

CALRAmp

CALOf

CAL?

RAmp?

SERVICE REQUEST GROUP 4-66

RQs ON|Of

RQs?

CER ON|Of

CER?

EXR ON|Of

EXR?

INR ON|Of

INR?

EXW ON|Of

OPc ON|Of

OPc?

User ON|Of

User?

PId ON|Of

PID?
SRQ?

WAVEFORM PREAMBLE GROUP 4-68

WFMpre? WFI d
WFMpre ENCd g: ASCII | BIN ary
WFMpre? ENCd g
WFMpre NR. pt: 820 | 1024
WFMpre? NR. pt
WFMpre? PT. Fmt
WFMpre Xincr: { x increment }
WFMpre? Xincr
WFMpre PT.OFF: { point number }
WFMpre? PT.OFF
WFMpre? XZero
WFMpre XUnit: { horiz scale factor }
WFMpre? XUnit
WFMpre YMult: { vertical scale factor }
WFMpre? YMult
WFMpre YZero: { vertical zero }
WFMpre? YZero
WFMpre YUnit: { vertical units }
WFMpre? YUnit

WAVEFORM PREAMBLE GROUP (Continued)

WFMpre? BYt/nr
 WFMpre? BN.fmt
 WFMpre? BIT/nr
 WFMpre? CRVchk
 WFMpre?

WAVEFORM CURVE GROUP 4-72

CURVe {ascii curve} | {binary curve}
 CURVe?

WAVEFORM PREAMBLE AND CURVE GROUP 4-73

WAvfrm?
 DATA ENCdg:ASCii | BINary
 DATA? ENCdg
 DATA INTERpolate:ON | OFF
 DATA? INTERpolate
 DATA MEMory: {1 to 6}
 DATA? MEMory

READOUT AND TEXT COMMANDS 4-74

TEXT "text"
 TEXT?
 RDout?

PROGRAMMING AIDS 4-75

ID?

SEt?

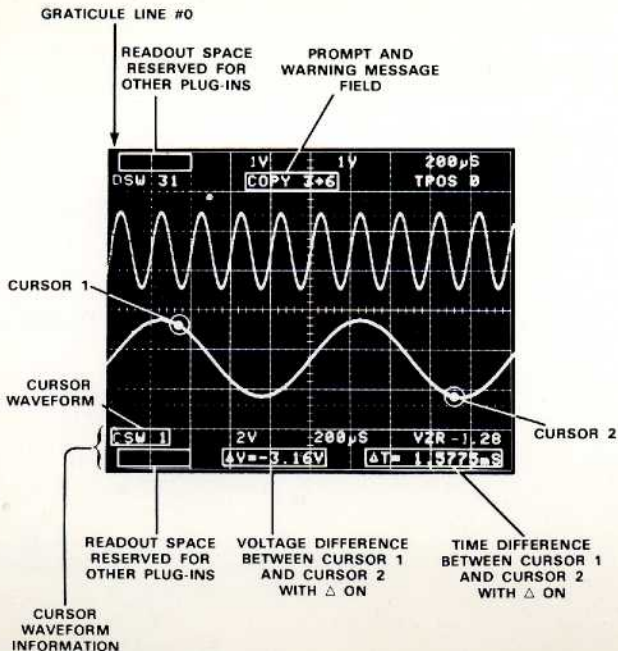
HElp?

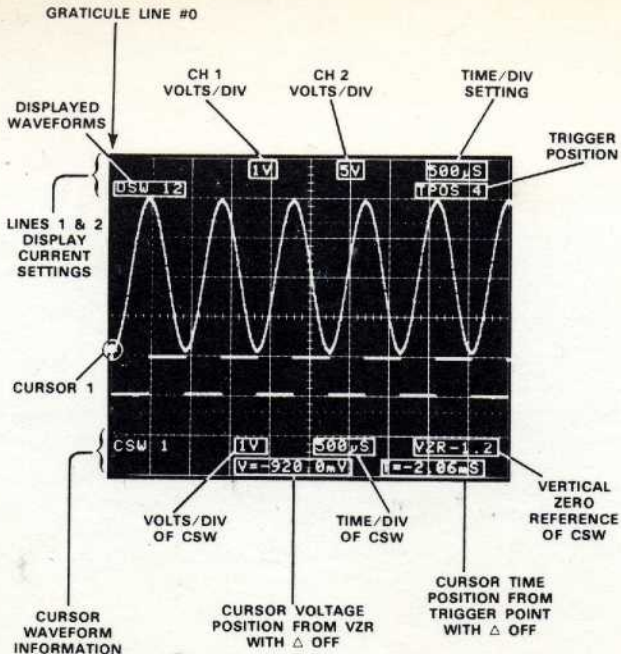
DEBug ON | OFF

DEBug?

LONGform ON | OFF

LONGform?





ASCII & GPIB CODE CHART

B7 B6 B5 BITS		B4 B3 B2 B1		B7 B6 B5 B4 B3 B2 B1		B7 B6 B5 B4 B3 B2 B1																			
CONTROL				NUMBERS SYMBOLS				UPPER CASE				LOWER CASE													
84B18281		0		20		40		0		100		0		120		16		140		0		160		16	
NUL		DLE		SP		0		@		P		Q		R		S		T		U		V		W	
0		10		16		20		32		30		48		40		64		50		80		60		50	
SOH		DC1		!		1		A		Q		R		S		T		U		V		W		X	
1		11		17		21		23		31		49		41		65		51		81		61		51	
STX		DC2		"		2		B		R		S		T		U		V		W		X		Y	
2		12		18		22		24		32		50		42		66		52		82		62		52	
ETX		DC3		#		3		C		S		T		U		V		W		X		Y		Z	
3		13		19		23		35		33		51		43		67		53		83		63		53	
EOT		DC4		\$		4		D		T		U		V		W		X		Y		Z		[
4		14		20		24		36		34		52		44		68		54		84		64		54	
ENQ		NAK		%		5		E		U		V		W		X		Y		Z		[]	
5		15		21		25		37		35		53		45		69		55		85		65		55	
ACK		SYN		&		6		F		V		W		X		Y		Z		[]		^	
6		16		22		26		38		36		54		46		70		56		86		66		56	
BEL		ETB		'		7		G		W		X		Y		Z		[]		^		_	
7		17		23		27		39		37		55		47		71		57		87		67		57	
BS		CAN		(		8		H		X		Y		Z		[]		^		_		`	
8		18		24		28		40		38		56		48		72		58		88		68		58	
1		10T		31		37		9		I		J		K		L		M		N		O		P	
1		11		17		21		25		111		9		131		25		131		25		131		25	
HT		EM		)		9		9		I		J		K		L		M		N		O		P	
9		19		25		29		41		39		57		49		73		59		89		69		59	
LF		SUB		.		10		72		72		28		112		110		130		26		130		26	
1		10		14		20		42		3A		58		4A		74		6A		90		6A		5A	
1		11		17		21		27		113		11		113		11		113		27		113		27	
VT		ESC		+		11		73		73		27		113		11		113		27		113		27	
1		12		18		22		43		3B		59		4B		75		6B		91		6B		5B	
FF		FS		=		12		74		74		28		114		12		124		28		124		28	
1		13		19		23		44		3C		60		4C		76		6C		92		6C		5C	
CR		GS		-		13		75		75		29		115		13		135		29		135		29	
1		14		20		24		45		3D		61		4D		77		6D		93		6D		5D	
SO		RS		.		14		76		76		30		116		14		136		30		136		30	
1		15		21		25		46		3E		62		4E		78		6E		94		6E		5E	
SI		US		/		15		77		77		31		117		15		137		31		137		31	
1		16		22		26		47		3F		63		4F		79		6F		95		6F		5F	
1		17		23		27		48		40		64		50		80		60		96		70		50	
1		18		24		28		49		41		65		51		81		61		97		71		51	
1		19		25		29		50		42		66		52		82		62		98		72		52	
1		20		26		30		51		43		67		53		83		63		99		73		53	
1		21		27		31		52		44		68		54		84		64		100		74		54	
1		22		28		32		53		45		69		55		85		65		101		75		55	
1		23		29		33		54		46		70		56		86		66		102		76		56	
1		24		30		34		55		47		71		57		87		67		103		77		57	
1		25		31		35		56		48		72		58		88		68		104		78		58	
1		26		32		36		57		49		73		59		89		69		105		79		59	
1		27		33		37		58		50		74		60		90		70		106		80		60	
1		28		34		38		59		51		75		61		91		71		107		81		61	
1		29		35		39		60		52		76		62		92		72		108		82		62	
1		30		36		40		61		53		77		63		93		73		109		83		63	
1		31		37		41		62		54		78		64		94		74		110		84		64	
1		32		38		42		63		55		79		65		95		75		111		85		65	
1		33		39		43		64		56		80		66		96		76		112		86		66	
1		34		40		44		65		57		81		67		97		77		113		87		67	
1		35		41		45		66		58		82		68		98		78		114		88		68	
1		36		42		46		67		59		83		69		99		79		115		89		69	
1		37		43		47		68		60		84		70		100		80		116		90		70	
1		38		44		48		69		61		85		71		101		81		117		91		71	
1		39		45		49		70		62		86		72		102		82		118		92		72	
1		40		46		50		71		63		87		73		103		83		119		93		73	
1		41		47		51		72		64		88		74		104		84		120		94		74	
1		42		48		52		73		65		89		75		105		85		121		95		75	
1		43		49		53		74		66		90		76		106		86		122		96		76	
1		44		50		54		75		67		91		77		107		87		123		97		77	
1		45		51		55		76		68		92		78		108		88		124		98		78	
1		46		52		56		77		69		93		79		109		89		125		99		79	
1		47		53		57		78		70		94		80		110		90		126		100		80	
1		48		54		58		79		71		95		81		111		91		127		101		81	
1		49		55		59		80		72		96		82		112		92		128		102		82	
1		50		56		60		81		73		97		83		113		93		129		103		83	
1		51		57		61		82		74		98		84		114		94		130		104		84	
1		52		58		62		83		75		99		85		115		95		131		105		85	
1		53		59		63		84		76		100		86		116		96		132		106		86	
1		54		60		64		85		77		101		87		117		97		133		107		87	
1		55		61		65		86		78		102		88		118		98		134		108		88	
1		56		62		66		87		79		103		89		119		99		135		109		89	
1		57		63		67		88		80		104		90		120		100		136		110		90	
1		58		64		68		89		81		105		91		121		101		137		111		91	
1		59		65		69		90		82		106		92		122		102		138		112		92	
1		60		66		70		91		83		107		93		123		103		139		113		93	
1		61		67		71		92		84		108		94		124		104		140		114		94	
1		62		68		72		93		85		109		95		125		105		141		115		95	
1		63		69		73		94		86		110		96		126		106		142		116		96	
1		64		70		74		95		87		111		97		127		107		143		117		97	
1		65		71		75		96		88		112		98		128		108		144		118		98	
1		66		72		76		97		89		113		99		129		109		145		119		99	
1		67		73		77		98		90		114		100		130		110		146		120		100	
1		68		74		78		99		91		115		101		131		111		147		121		101	
1		69		75		79		100		92		116		102		132		112		148		122		102	
1		70		76		80		101		93		117		103		133		113		149		123		103	
1		71		77		81		102		94		118		104		134		114		150		124		104	
1		72		78		82		103		95															

KEY

- on some keyboards or systems

hex	15	21	hex
octal	25	ppu	octal
NAK			
		ASCII character	ASCII code